ARMY review completed. Release as redacted.

Annex 1

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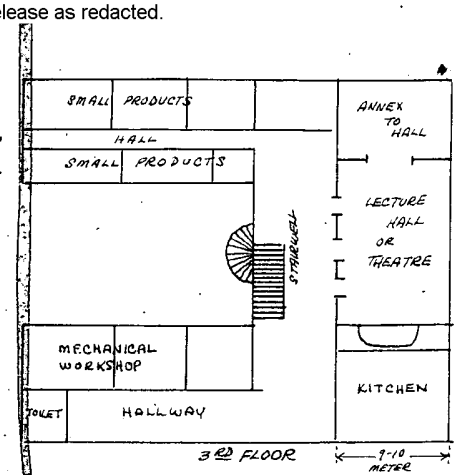
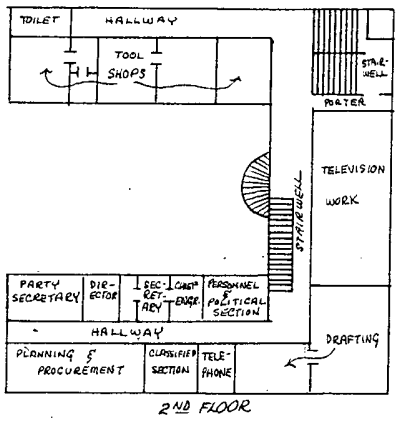
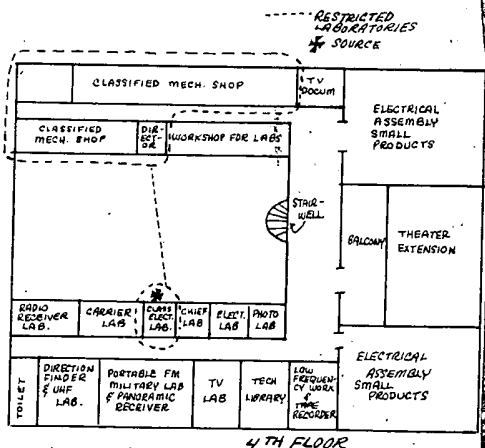
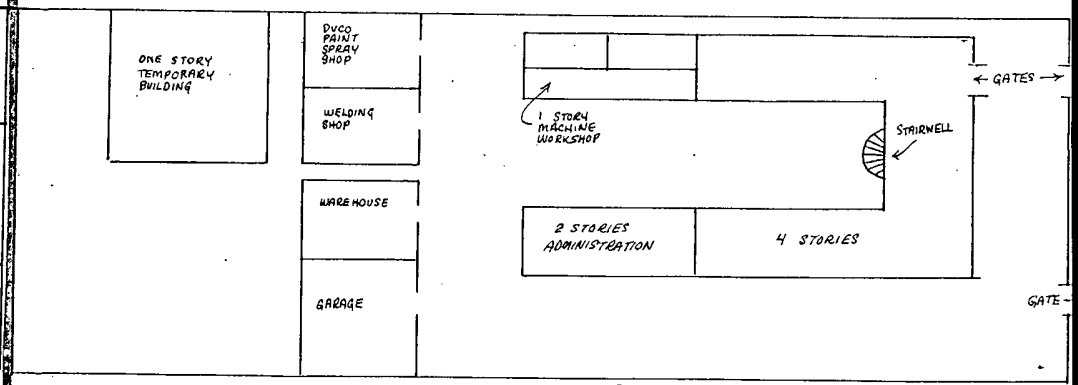
FLOOR LAYOUT OF THE MECHANICAL LABORATORY AT GORKIJ FASOR 25 ST. BUDAPEST

25X1









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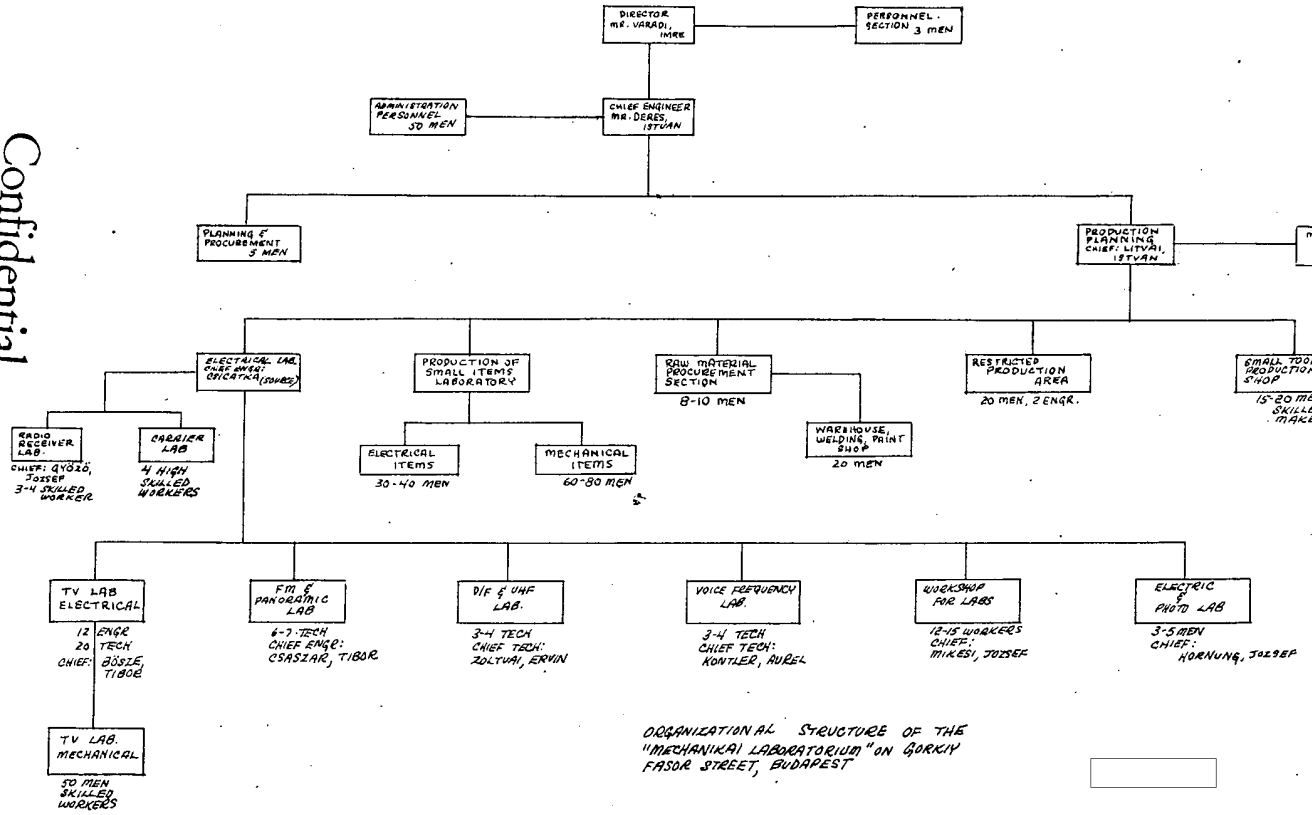

ORGANIZATIONAL STRUCTURE OF THE "MECHANIKAI LABORATORIUM" ON GORKIY FASOR STREET, BUDAPEST

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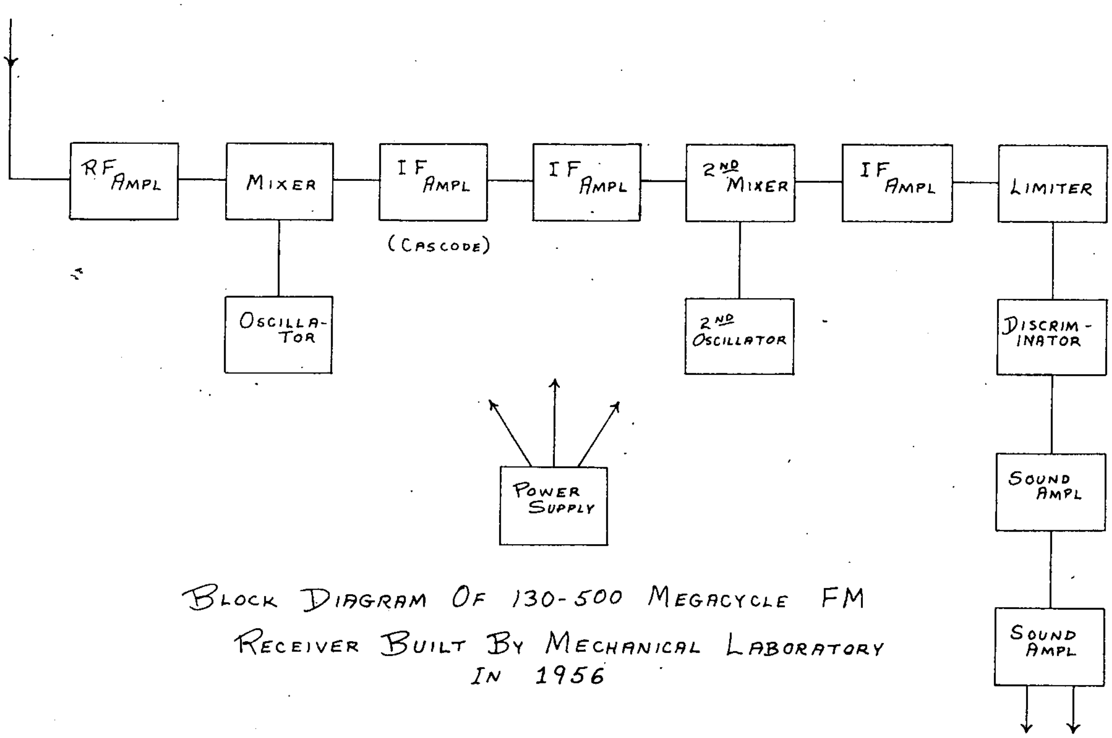
25X1

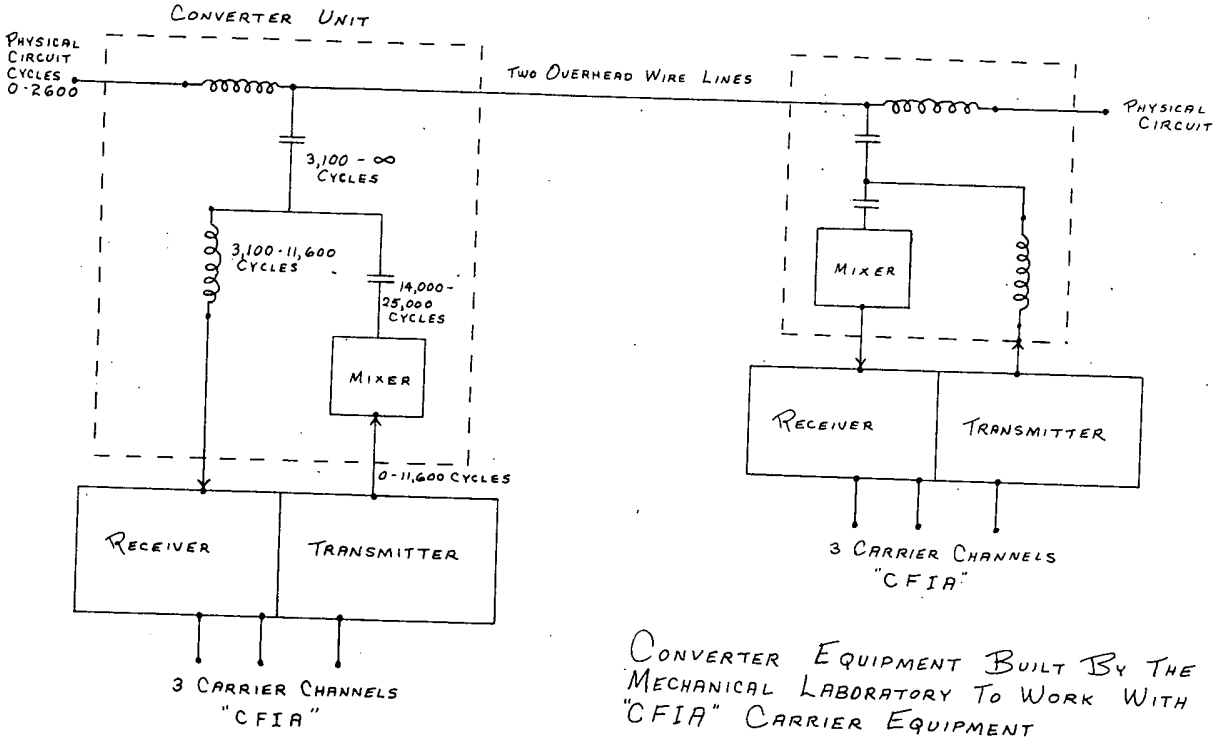
Annex 3



Block Diagram Of 130-500 Megacycle FM Receiver Built By Mechanical Laboratory In 1956

Annex 4

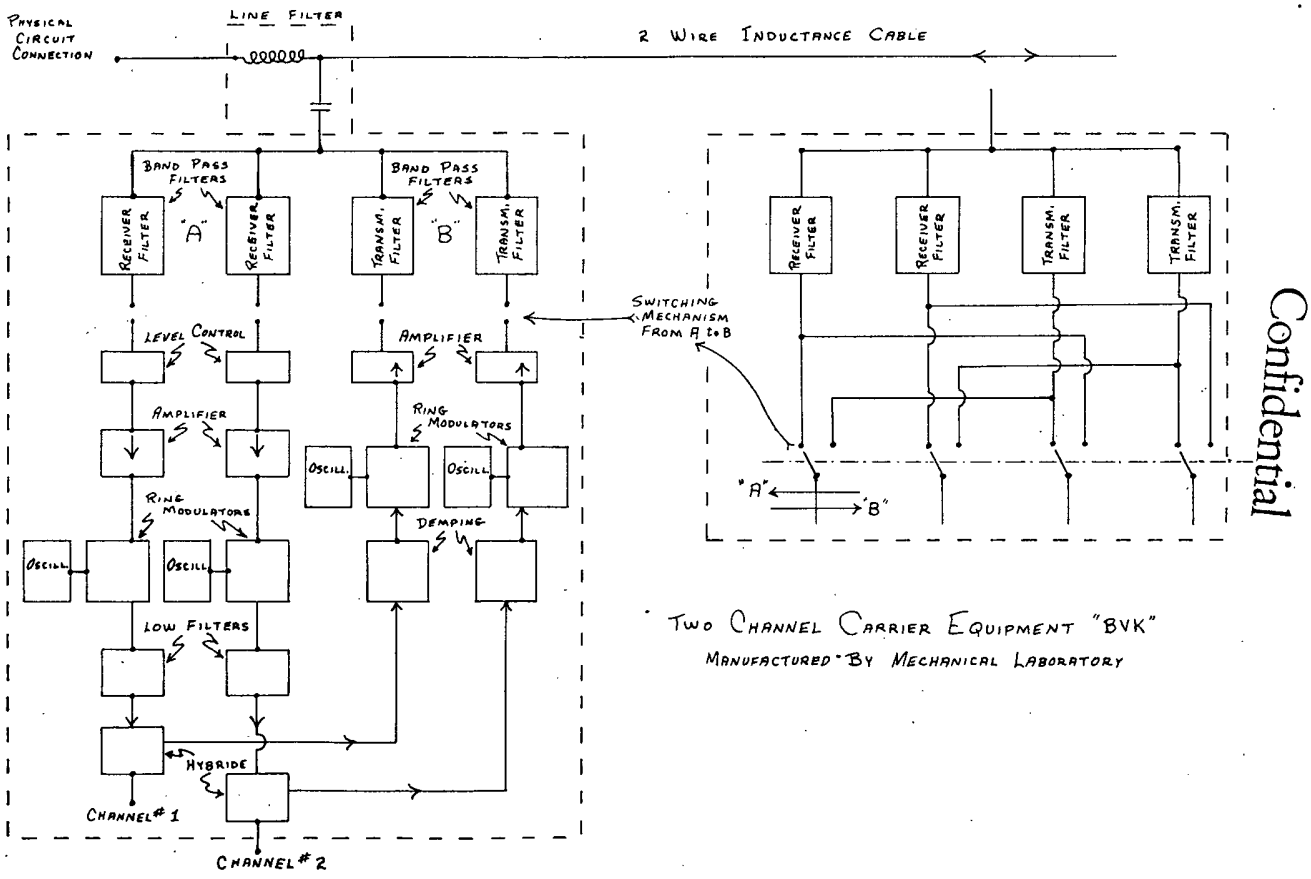
25X1



CONVERTER EQUIPMENT BUILT BY THE MECHANICAL LABORATORY TO WORK WITH "CFIA" CARRIER EQUIPMENT

Annex 5

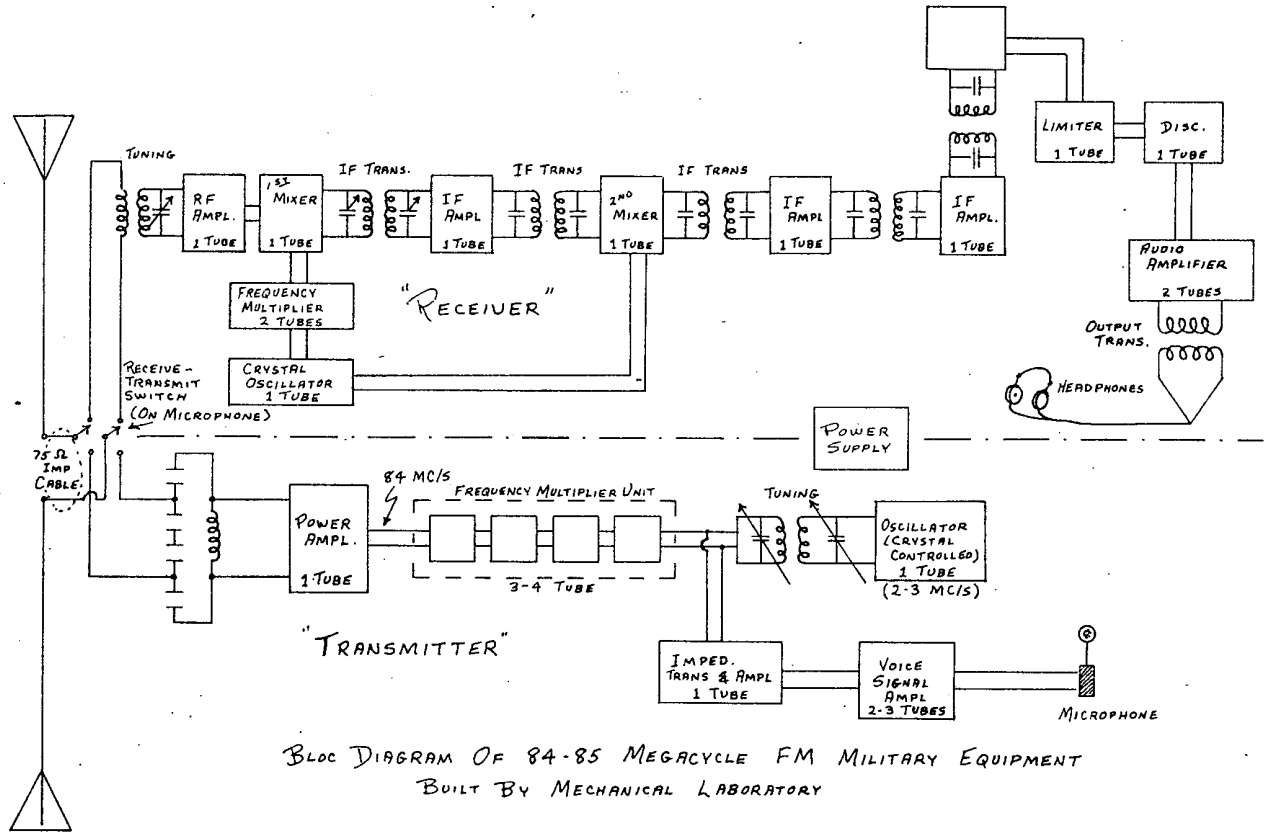
25X1



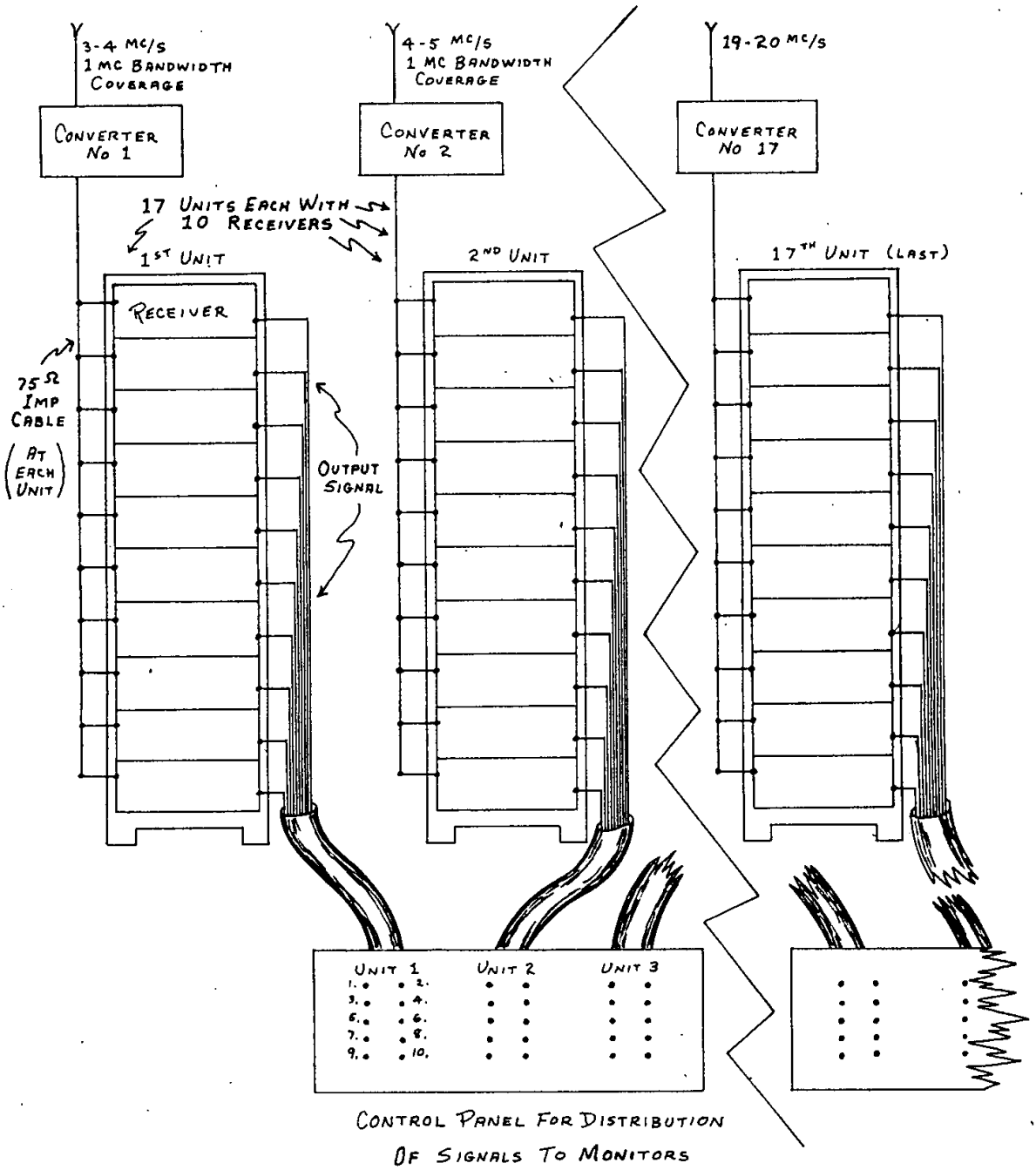
TWO CHANNEL CARRIER EQUIPMENT "BVK"
MANUFACTURED BY MECHANICAL LABORATORY

25X1

Annex 6



BLOC DIAGRAM OF 84-85 MEGACYCLE FM MILITARY EQUIPMENT
BUILT BY MECHANICAL LABORATORY



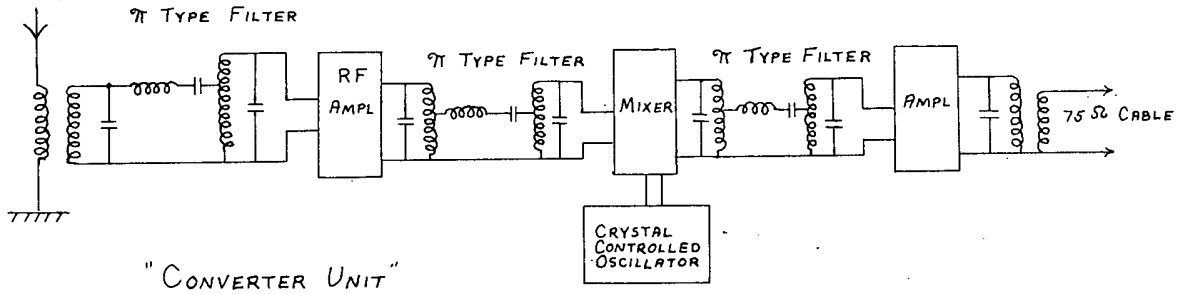
EQUIPMENT SET-UP FOR MONITORING

25X1

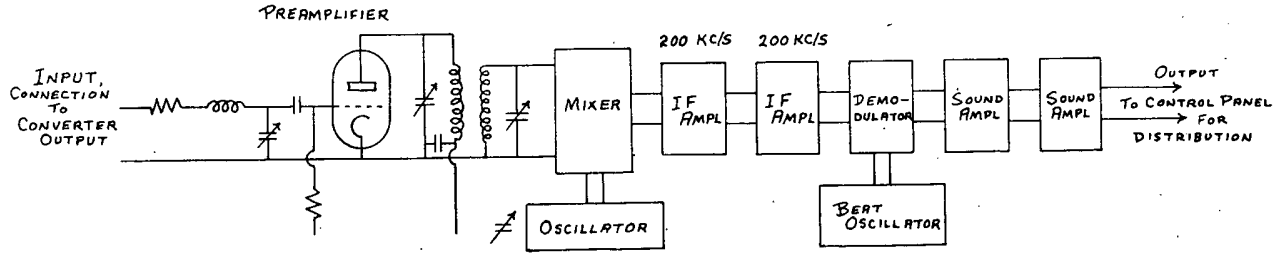
Annex 7

25X1

Annex B



"CONVERTER UNIT"



RECEIVER UNIT

CONVERTER & RECEIVER UNITS USED BY THE MILITARY POLITICAL DEPARTMENT FOR MONITORING

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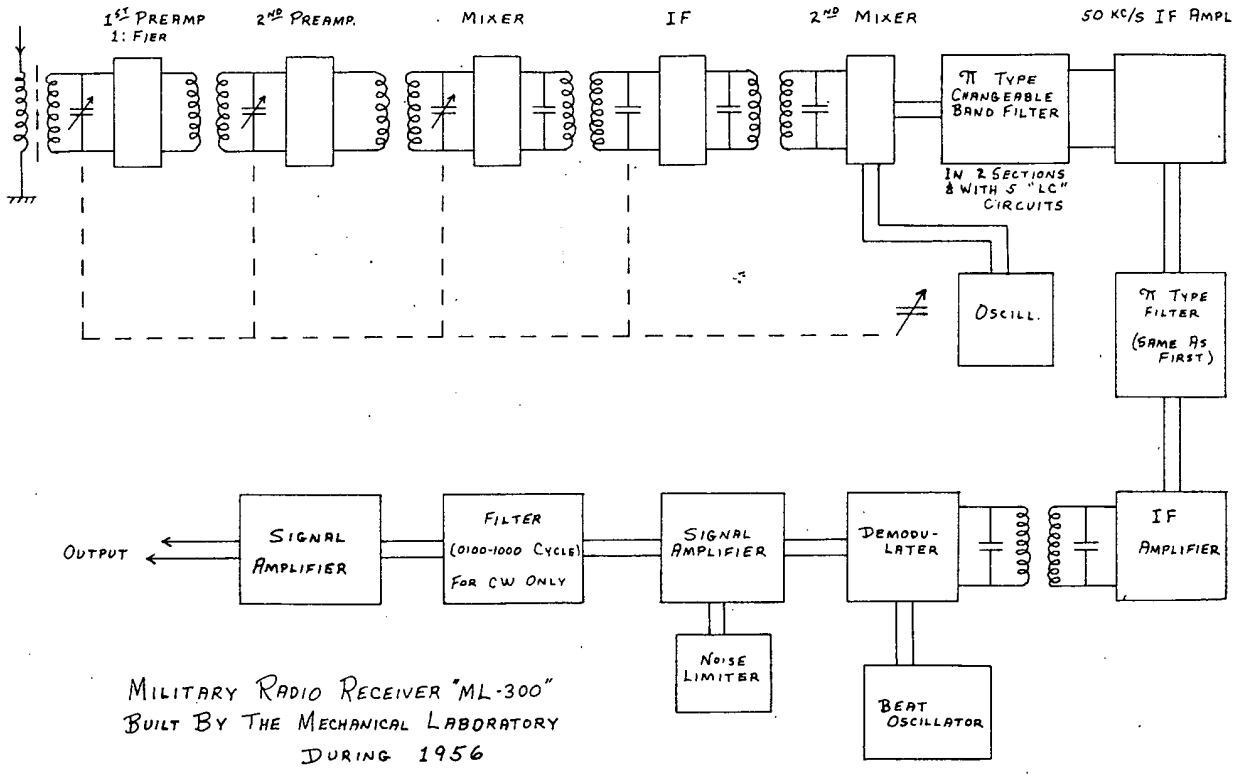
Array 9

25X1



MILITARY RADIO RECEIVER "ML-300"
BUILT BY THE MECHANICAL LABORATORY
DURING 1956

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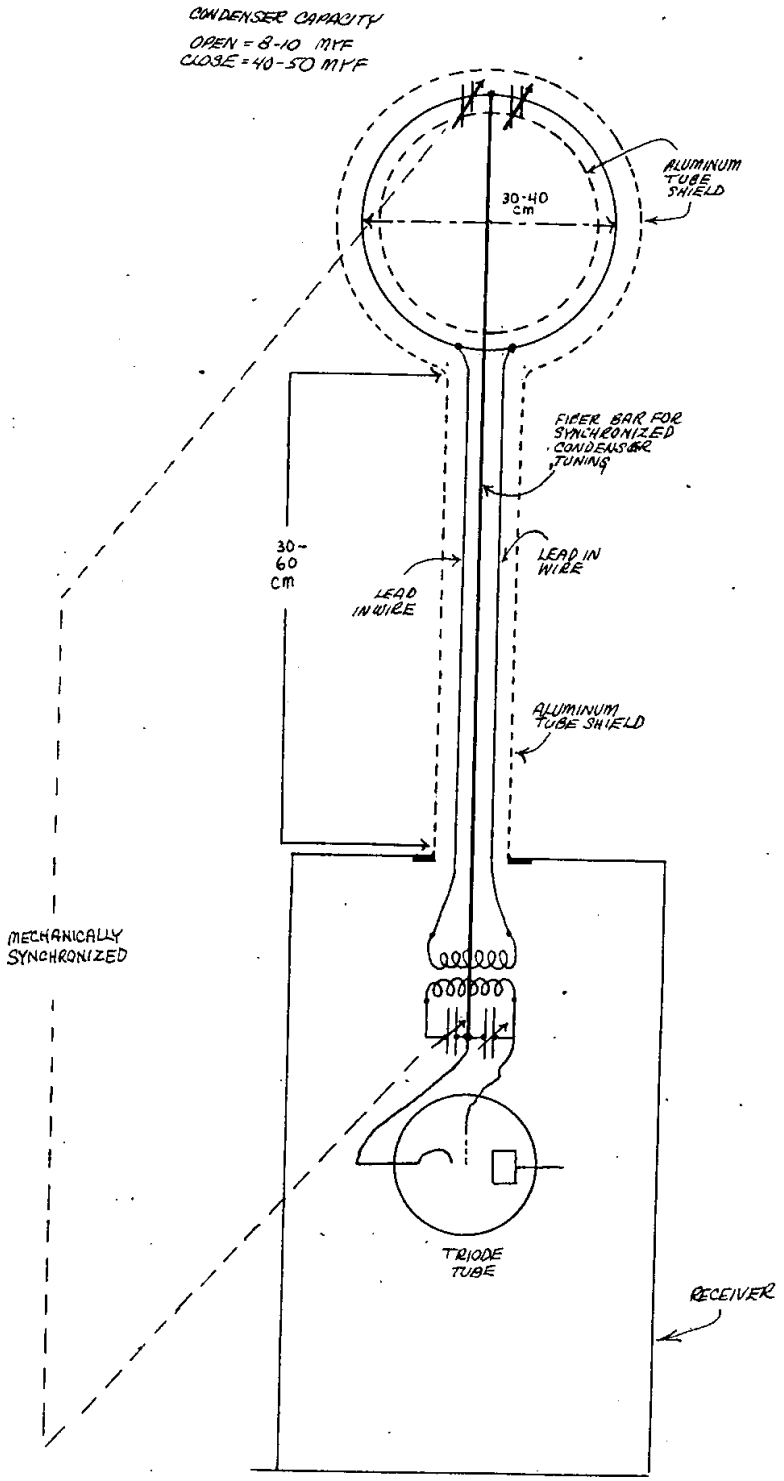
SHORT WAVE D/F ANTENNA BUILT BY MECHANICAL LABORATORY



Annex 10

C-O-N-F-I-D-E-N-T-I-A-L | SEE BOTTOM OF PAGE FOR SPECIAL CONTROLS, IF ANY

INFORMATION REPORT

PREPARED AND DISSEMINATED BY
CENTRAL INTELLIGENCE AGENCY

COUNTRY: Hungary

25X1

SUBJECT: Electronics Research at the Mechanical Laboratory (Mechanikai Laboratorium)

DATE DISTRIBUTED: 4 April 1957

NO. OF PAGES: 5 | NO. OF ENCLS.:

SUPPLEMENT TO REPORT #:

25X1

THIS IS UNEVALUATED INFORMATION

25X1

This report is the result of a joint collection effort by the Air Force, the Navy, the Army, and CIA, and is disseminated in accordance with the provisions of NSCID #7.

1. The Mechanical Laboratory called the "Mechanikai Laboratorium", is located at Gorki Fasor 25 in the 7th district in Budapest, in a four story brick building. During 1952-1953 [redacted] built the first prototype of an AM-FM battery operated military-type radio receiver covering the frequency spectrum of 20 to 250 megacycles. During 1953-1955 there were about 100 to 150 of these sets manufactured for the use by the Hungarian Air Force as well as other military services. The frequency spectrum was divided into six bands. Some of the technical, physical and operational characteristics of this set are as follows:

25X1

a. Tuning mechanism: Two stage variable condensers. (No RF amplifier stage.)

b. Tube characteristics: 6J6 mixer tube; all other tubes of Hungarian manufacture.

c. Intermediate frequency: 5 megacycles.

d. Antenna type: Quarter wave dipole with an input impedence of 75 ohms. Every two frequency bands had one separate antenna. This receiver could also operate on horizontal or vertical type antennas.

e. Lead in cable to the antennas: German-type coaxial cables, with stiroflex insulators.

f. Sensitivity: 10 to 20 microvolts. (This is measured by connecting an RF frequency generator to the input of the receiver and a voltmeter to the output stage.)

C-O-N-F-I-D-E-N-T-I-A-L

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g. Signal to noise ratio: 1:3

This set had a total of 12 stages, which were: the mixer, three IF (FM) stages; two IF (AM) stages; one FM limiter; one discriminator; one AM detector; two voice frequency amplifier stages; and the power supply.

2. In August 1956, we built the prototype of a military FM receiver covering the frequency spectrum of 130-500 megacycles in eight bands, which may be compared to the UK "Eddystone" set. 25X1

25X1

A total of 100 of these sets were produced up to November 1956, and were destined for China. Production was stopped during the revolution. Some of the technical and operational features of this set are as follows: 25X1

a. Tuning mechanism: Three gang variable condenser

b. RF stage: Grounded grid system

c. Mixing stage: Diode tube rather than crystal

d. Sensitivity: 10 Microvolts at 500 megacycles

e. Signal to noise ratio: 1:3

f. Intermediate Frequency: Standard 40 megacycles, which begins in a cascode amplifier in addition to two other IF amplifier stages. The If frequency from the second mixer stage is 6 megacycles.

3. In 1948 25X1 the Post Office authorities submitted a project which consisted of designing and building a converter to operate with "CF1A" US type telephone carrier equipment, by using only two wires instead of four. 25X1

total of 11 of these sets were manufactured. They are currently 25X1
being used (November 1956) in Budapest, Szolnok, Debrecen, Nyiregyhaza, Szeged, Miskolc and a few other places 25X1 In 1948, the Post Office had in its possession 40 to 50 "CF1A" carriers.

4. Telephone carrier equipment used in Hungary is a mixture of various foreign types, such as Siemens, AEG (German), Philips (12 and 16 channel), etc. Belloiomnisz was very active in the manufacturing of three and 12 channel carrier equipment during 1953-1956. The 12 channel was built in 1954 and was used by the Hungarian Post Office; whereas, the three channel equipment was in steady production. In 1955-1956 a total of about 150 to 200 modified models of the three channel sets were sent to China alone.

5. The Mechanical Laboratory built a prototype of a 2+1 channel telephone carrier called "BVK". A total of 10 units were produced by the Siemens Factory of Budapest for the Hungarian Army. This equipment was somewhat similar to that of the German "TFB1" type with the exception that set 25X1
had an amplifier stage. This equipment was later presented to the Soviet engineers for study purposes. Later on in 1956 designed and built a 25X1
prototype of a modified version of the one channel German "TFB1" carrier equipment to operate on a.c. current, battery, or generator. A 12 volt accumulator was used for the heating of the filament as well as to activate the generator. Although the mass production goal for this equipment was set at 100 units, only 30 percent of the tooling project was completed. No units were produced. This equipment was to be used by the Hungarian Army, mostly by the border guards stationed in Western Hungary.

6. In 1952 designed and built 20 to 30 prototypes of a military type, one megacycle bandwidth, FM receiver and transmitter to be used in fixed installations as well as in mobile units. The technical, operational and physical characteristics of the transmitter and the receiver units are as follows: 25X1

a. Transmitter:

(1) Frequency coverage: 84-85 megacycles

(2) Power output: 10-15 watt

(3) Type oscillator: Crystal

(4) Number of tubes: 9-10 tubes

(5) Coverage: 8-10 kilometers

(6) Power supply: Battery activated vibrator; or city electric power (110 or 220 volts ac)

(7) Type signal: Phone

(8) Type modulation: Phase modulation

(9) Size of cabinet: 50 centimeters long; 30 centimeters wide; and 22 centimeters high

(10) Weight: 15 kilograms

(11) Type cabinet: Aluminum.

b. Receiver:

(1) Frequency coverage: 84-85 megacycles

(2) Sensitivity: 2 microvolts

(3) Signal to noise ratio: 1:5

(4) Intermediate frequency bandwidth: Plus or minus 20 kilocycles

(5) Number of tubes used: 15 tubes

(6) Power supply: Same as transmitter (as described above).

The performance of this set was proven to be very satisfactory.

7. During 1954-1956, the Mechanical Laboratory completed a very important project which consisted of designing and building high frequency radio receivers capable of covering the frequency spectrum of three thousand to 20 thousand kilocycles. This equipment was to be used for monitoring purposes by the AVO. We manufactured a total of 125 to 150 units, each consisting of 10 receivers. Each unit was controlled by a converter that covered one megacycle bandwidth in the 3-20 megacycle frequency spectrum. Every receiver in a unit was tuned to a specific frequency within the bandwidth covered by the converter; thus, a monitoring station required 17 units for full coverage of a given frequency spectrum. The connection of the receivers in a unit to the converter is made by means of 75 ohms impedence cables.

8. The receiving sets in each unit are connected to a control board (usually each control board controls three to four units) to distribute the incoming signals to the monitors. When a signal requires automatic recording because of its high speed, the control board can switch this signal to an amplifier unit and then to an automatic recording machine. Beat frequency of the oscillators in each receiver can also be controlled by this board. Furthermore, there is a magic eye tube for each receiver on the control board, to check the incoming signal.

9. The following is a description of the receiver:

The input consists of a series of resonant circuits with grid current higher than the input current. The first stage has a preamplifier unit

followed by a band filter operating under critical coupling conditions connected to the mixer stage. The resultant frequency is fed to the first and second intermediate frequency amplifier stages. The IF frequency is 200 kilocycles. The amplified IF frequency is then fed to the detector and the beat frequency oscillator unit, which is remote controlled. The resultant signal from the detector stage is amplified and fed to a 600 ohm voice frequency transformer.

10. The main highlights or outstanding features of these sets are as follows:

a. Excellent frequency stability

b. Uniformity of receivers

c. Broad bandwidth

d. Pretuning facilities

e. Free of interference

f. Local oscillator to antenna interference negligible.

11. During October 1956 designed and built 10 prototypes of military radio receivers covering the frequency spectrum of 2-22 megacycles, divided into five bands. These receivers were called the "ML-300" by our laboratory and were actually a modified version of similar sets that have been in production since 1950. (Up to 1956, approximately 600 of the old model were produced) The only difference between the "ML-300" and the old model was the additional preamplifier stage and the filter unit, after the second mixer stage, in the modified equipment; otherwise, the basic characteristics in the circuitry were the same. Some of the technical features of the "ML-300" are as follows: 25X1

a. Sensitivity: Three microvolts, constant on all frequencies, with better sensitivity on broad band

b. Signal to noise ratio: 1:5

c. Power supply: In a separate unit housing a battery to activate a vibrator; and a transformer and rectifier tube and filter when city electric power is used.

The "ML-300" as well as the old model were also used with the Adcock direction finding equipment. These sets have proven to be very satisfactory.

12. In 1954, the restricted sections of my laboratory completed work on a computing machine designed to operate with anti-aircraft equipment. This project was first given to the Hungarian Military Signal Technical Institute (H.T.I.) on Olasz Fasor in the Buda section of Budapest. 25X1
25X1
this set 25X1
had approximately 100 tubes, and was equipped with a wind speed correcting facility. 25X1
the instrument had shown great errors when tested. 25X1

13. During 1951-1952 engaged in designing and manufacturing a goniometer coil system for the Adcock direction finding equipment. The previously discussed radio receiver (2-22 megacycles) was used in conjunction with this set up. The gonio coils had Faraday shielding, with coaxial cables from each antenna connected to each coil. 25X1
25X1
ment. A total of 100 gonio coils were manufactured between 1952 and 1956. 25X1

14. In 1956 built three prototypes of a short wave direction finder that could operate between 20 to 45 megacycles, in one band. The antenna is 25X1

25X1

demountable and can be carried in a separate case. Manufacture of this equipment has been extremely difficult; it took [redacted] whole year to perfect it. 25X1

15. In 1953, the Ministry of Posts and Transportation assigned a project to the "Audio" factory (presently a part of Orion) which consisted of building the necessary equipment for a television studio. Because of unsatisfactory results, the project was later reassigned to the Mechanical Laboratory. All blue prints and brochures, for technical specifications, had to be bought from the USSR for about three million forints. The Soviets did not make any contribution in the line of equipment or technical help. Some of the main equipment built by the Mechanical Laboratory consisted of five television monitoring units and five cameras. Work was completed sometime in October 1956, just before the revolution.

16. The television studio will be set up in the "Tozsde Palota" building, the same building which houses the Lenin Institute. Video and sound connection between the studio and the transmitting station will be made by means of a microwave link. The present transmitting equipment, one kilowatt, built by Belloionnisz, will soon be replaced by a German make 30 kilowatt transmitter.

- end -

[redacted] sketches and diagrams as follows: 25X1

1. Sketch, Floor Layout of the Mechanical Laboratory
2. Chart Showing the Organizational Breakdown of the Mechanical Laboratory
3. Block Diagram of 130-500 megacycle FM Receiver Built by Mechanical Laboratory
4. Block Diagram of a Converter Used with CF1A Carrier Equipment
5. Block Diagram of Two Channel Carrier Equipment Built by the Mechanical Laboratory
6. Block Diagram of a 84-85 Megacycle Military FM Transmitter-Receiver
7. Block Diagram of a High Frequency Converter and Receiver used for Monitoring
8. Sketch showing Equipment Set Up for Monitoring
9. Block Diagram of a Military Type Radio Receiver Called ML-300 (Factory name)
10. Sketch of a 20-45 Megacycles Direction Finding Antenna built by the Mechanical Laboratory